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heave up and down for a few seconds and then burst into a fountain, which would shoot up twenty or thirty feet, play a few seconds, and then fall back into the lake below. A similar process would go on at the same time in a nearby spot, and two fountains would invariably play within a few seconds of each other. Then, as they fell, the crust would cool over the place that had been so furiously active, and after a few minutes of quiescence the same action would be repeated. Two islands of lava stood unmelted in the north-west side of the lake. We heard a furious hissing and blowing on the southeast, but did not go that way to examine. A tropic bird, *Phaëton*, came sailing over the fire lake, paused a moment near us, and flew away to the east.

I took these bearings from Halemaumau: highest bluffs of Kilauea crater, N. 33° W.; flow of 1832, N. 65° E. We found some *ti* leaves (*Dracæna*) scattered about, evidences of recent visits; left the place at about noon and returned by a nearly straight course to the place of our descent into the crater. The next morning, at 4:30, as I left Kilauea, the fires of Pele, sixty in number, gleamed spectrally through a driving rain.

This account, in spite of its imperfections, shows, I think, that the activity at Kilauea in July, 1855, was not to be reckoned as a true eruption. The great dome of Halemaumau disappeared a few months later, whether coincidentally or not with the great eruption from Mauna Loa, beginning in September, it would be interesting to know. That eruption, which lasted fifteen months, threatening the village and bay of Hilo, was fully and vividly described, by my father, Titus Coan—"The Bishop of the Volcano," as the Hawaiians loved to call him.

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#### SCIENTIFIC BOOKS

*Der Begriff des Instinktes einst und jetzt: eine Studie über die Geschichte und die Grundlagen der Tierpsychologie.* Von Dr. HEINRICH ERNST ZIEGLER. Zweite, verbesserte und vermehrte Auflage. Mit einem Anhang: Die Gehirne der Bienen und Ameisen. Jena, Gustav Fischer. 1910. Pp. vi + 112.

The first edition of this monograph was published in the Weismann Festschrift (*Zool-*

*ogische Jahrbücher*, Supplement VII., 1904). In the present edition the historical sections have been amplified, and account has been taken of some of the more recent literature on the subject. As no review of the first edition seems to have appeared in this journal, it will be best to discuss the essay as a whole.

Its introductory sections, on the history of the concept of instinct, bring out more clearly than the reviewer remembers to have seen done elsewhere, the fact that the opposition between the tendency to humanize animals and the tendency to regard them as separated from man by an impassible gulf has been more or less continuously evident through the whole history of thought. Ziegler's own notion of instinct is, as is well known, that of a thorough-going Neo-Darwinian: the "inherited habit" theory he emphatically rejects. To the Lamarckianism of Semon's recent attempt to make heredity a form of memory he objects that heredity, as an affair of the single cell, can have nothing in common with memory, which demands a nervous system: this objection evidently involves a difference of definition. Ziegler offers nothing essentially new on the question as to the distinguishing marks of an instinctive action: it is action based on inherited nervous connections.

As for the problem of consciousness in animals, he declares it to be insoluble. Animal psychology, he thinks, should not be based on this problem. "This view is not in accord with the opinion of those psychologists who regard consciousness as the essential mark of the psychic. Such psychologists are, however, not in a position to further animal psychology." Nevertheless, he has a good deal to say on the insoluble problem. Where the nervous system of an animal is very unlike that of man, Ziegler thinks consciousness, even in the form of pleasure and pain, very improbable. He quotes from von Uexküll Norman's observation on the earthworm, the head end of which, when the animal is cut in two, crawls away undisturbed, while the squirming movements are confined to the hinder end. One meets this observation so often serving as actual disproof of the existence of pain, indeed

of consciousness in general, in the lower forms of animal life, that it may be well to remind ourselves of its analogy with the fact that the facial expressions produced by sweet and bitter tastes have been noted in an infant whose cerebral hemispheres were lacking. We do not regard the reflex production of these facial movements under abnormal conditions as incompatible with their being normally the expression of conscious process: why then should the squirming movements of the detached hinder end of a worm prove that such movements are not normally the accompaniment of pain sensation? The author uses as an *a priori* argument against the existence of pain sensations in animals of low structure the consideration that such sensations would be of no use to an animal like the earthworm, for the function of pain is to serve as a warning enabling an animal to avoid harmful stimuli in the future. "A mammal that has been hurt by a man will fear and so far as possible avoid man in the future, but an earthworm can neither recognize nor avoid man." This reasoning seems highly superficial, in view of the fact that recent work on the lower invertebrates has shown that reactions of anticipation, where one stimulus comes to serve as a "warning" of another, causing the avoiding reaction to be made before the second and injurious stimulus arrives, are found even in animals as low as the sea-anemone.

To the higher mammals, however, Ziegler would not deny the possession even of memory ideas, and it is amusing to find him quoting Ament's wholly uncritical observation on the dog that licked the ice off the window pane and looked out, as evidence that "ideas of ends" are present in the mind of a higher animal. Truly it is hard to be consistent in one's use of facts as evidence when one is guided by *a priori* considerations. The essential difference between the human mind and that of the other mammals Ziegler holds to be the possession of abstract ideas.

One of the later sections of the essay gives a brief account of the author's theory that acquired or "embiontic" pathways in the nervous system depend "on small and slow

changes (of form and especially of thickness) in the ramifications of the cell processes, as well as on the formation of paths within the cell-body (formation or strengthening of neurofibrils)."

The appendix on the brain of ants and bees is explanatory of some plates from models by Ziegler's pupils.

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#### THE PROBLEM OF ELEMENTAL LIFE

RECENT investigations on the part of certain physiologists and histologists tend to throw some new light upon perhaps the greatest of all scientific and philosophical questions, the problem of life and death. Whereas until recently the transition from the state of life to that of death was considered, at least by the medical and legal profession, to occur at the moment when the heart stopped beating, recent observations tend to show that besides this general conception of life and death, there exists also an entirely different form of life, an elemental life of the tissues, which under certain conditions may continue for long periods after the general life of the animal has ceased, after the heart has stopped beating and the personality of the individual has been lost. The elemental death begins, under normal conditions, promptly after general death has occurred and is caused by the two factors of bacterial invasion and ferment activity, the change manifesting itself by loss of cell tension and alterations in cell form, the first steps toward putrefaction and dissolution. If, however, immediately after general life has ceased to exist, fragments of tissue are removed from the body and placed in such a condition as to prevent bacterial or ferment action, the elemental life of the tissue may be maintained over long periods of time. Such a life is latent; it shows no signs of vital activity; upon such a piece of tissue being replaced in the animal body and its nutrition being maintained by a renewal of the circulation, life again becomes manifest, and the tissue renews its functional activity as a part of the living organism.